

WHAT IS CLAIMED IS:

1. A method of watermarking a video signal by applying a watermarking function to motion vectors calculated by estimation of movement between images of the video

5 signal, the method comprising the following steps:

- applying the watermarking function to at least some of the calculated motion vectors; and
- generating the watermarked video signal by compensating movement with the aid of the

10 watermarked motion vectors,

the watermarking function being applied with the aid of a binary marking key, each bit of which is associated with at least one selected motion vector, wherein, in order to apply the watermarking function, the method further

15 comprises the following steps:

- marking the coordinates of the selected motion vector ( $\vec{V}$ ) in a reference space divided into a plurality of predetermined portions;
  - defining two complementary zones  $Z_0$  and  $Z_1$  in each
- 20 portion, one of the two zones being situated inside the other one;
- assigning a binary value to each of the two zones; and
  - where necessary, modifying the coordinates of the
- 25 selected motion vector so that it is in the zone of the portion to which it belongs, of binary value which corresponds to the bit of the marking key with which the selected motion vector is associated.

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2. A method according to claim 1 for watermarking a video signal, wherein the reference partition is a reference grid including blocks with predefined dimensions, each block including first and second zones.

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3. A method according to claim 1 for watermarking a video signal, the method including the following steps:

- calculating a hierarchical plurality of successive levels of motion vectors, the motion vectors of a given level each being associated with a plurality of motion vectors of the next lower level;
- 5    - selecting at least some of the motion vectors belonging to the highest level;
- applying the watermarking function to each selected motion vector, leading to calculating a modification parameter for said motion vector; and
- 10   - applying the modification parameter of the selected motion vector to the motion vectors of a lower level associated with said motion vector.

4. A method according to claim 3 for watermarking a video  
15 signal, wherein the motion vectors of a given level are each equal to the average of the motion vectors of the next lower level with which they are associated.

5. A method according to claim 3 for watermarking a video  
20 signal, the method including a step of calculating a hierarchy of two successive levels of motion vectors, each motion vector of the higher level being associated with four motion vectors of the lower level.

25 6. A method according to claim 1 for watermarking a video signal, wherein the first and second zones have substantially equal areas.

7. A method according to claim 1 for watermarking a video  
30 signal, wherein a sub-block centered inside the block is defined in each block of the reference grid, the first zone being defined by the interior of the sub-block and the second zone being the zone in the block complementary to the first zone.

8. A method according to claim 7 for watermarking a video signal, wherein the blocks and sub-blocks of the reference grid are rectangular.

5 9. A method according to claim 1 for watermarking a video signal, wherein the modification, if any, applied to the selected motion vector ( $\vec{V}$ ) is a weighted symmetry.

10 10. A method according to claim 8 for watermarking a video signal, wherein the modification, if any, applied to the selected motion vector ( $\vec{V}$ ) is either a weighted central symmetry relative to one of the vertices of the sub-block or a weighted axial symmetry relative to one of the sides of the sub-block.

15 11. A method according to claim 1 for watermarking a video signal, wherein each bit of the binary marking key is associated with a plurality of selected motion vectors.

20 12. A method according to claim 1 for watermarking a video signal, wherein some of the bits of the binary marking key are associated with motion vectors calculated by motion estimation between two images of the video  
25 signal, and wherein at least one other portion of the bits of the binary marking key is associated with motion vectors calculated by motion estimation between at least two other images of the video signal.

30 13. A device for watermarking a video signal, the device including means for implementing a method according to claim 1.

35 14. A computer readable data medium, including means for storing a video signal watermarked with the aid of a method according to claim 1.

15. A method of extracting watermarking from a video signal watermarked by applying a method according to claim 1, which extraction method comprises applying a function for extracting the binary marking key, and

5 consisting in:

- selecting the watermarked vectors;
  - marking the coordinates of each watermarked motion vector in the reference partition; and
  - assigning the binary value of the zone in which the watermarked vector is situated to the bit of the marking key with which the selected motion vector is associated.
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16. A method according to claim 15 for extracting the watermarking from a video signal watermarked by applying a method according to claim 3, wherein, for each motion vector of the highest level selected on application of the watermarking method, the following steps are applied:

- extracting the watermarked motion vectors associated with said motion vector;
  - calculating an average vector equal to the average of the watermarked motion vectors associated with said motion vector; and
  - applying the marking key extraction function to the calculated average vector.
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17. A device for extracting the watermarking from a video signal, the device including means for implementing a method according to claim 15.

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